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MISA

Petroleum

STOPPING WATER POLLUTION AT ITS SOURCE

MISA

Municipal/Industrial Strategy for Abatement

THE ECONOMIC AND FINANCIAL PROFILE OF THE PETROLEUM REFINING SECTOR

SUMMARY REPORT

AUGUST 1988

Ontario
Ministry of the Environment

Hon. Jim Bradley
Minister

Gary S. Posen
Deputy Minister

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SUMMARY REPORT

August 1988

Policy and Planning Branch
Corporate Resources Division
Ontario Ministry of The Environment

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ABSTRACT

- Petroleum refineries constitute one vertical sector of the petroleum industry. The major oil companies are vertically integrated and operate in each level of the business.

- The 28 refineries operating in Canada are owned by 12 firms. Six firms currently operate 7 refineries in Ontario. In 1985, these establishments accounted for 31 percent of total Canadian capacity. The refineries in Ontario are owned by Esso Petroleum (Imperial Oil), Petro-Canada, Petrosar, Shell Canada Products, Suncor and Texaco Canada.

- In 1984, four firms controlled 75 percent of Ontario's total refinery capacity. This sector can, therefore, be considered to be concentrated.

- Product consumption in Ontario for 1985 was 87 percent of refinery production. The remaining 13 percent was exported to the U.S.

- Transportation fuels such as gasoline, aviation fuel and diesel fuel made up 50 percent of the total Ontario refinery output in 1985.

- Consumption of refined petroleum products in Ontario declined by 21 percent from 1979 to 1983. However, consumption has increased by 4.5 percent between 1983 and 1985. Similarly, annual refinery output in Ontario has declined over the past 7 years from a high of 34.4 million m^3 to a low of 28.8 million m^3 in 1982. Ontario's total refinery output in 1985 remained 15 percent below 1979 levels.

- Between 1975 and 1985, the number of refining establishments in Canada has declined by 14, from 42 to 28.

- In 1985, the Canadian oil industry was deregulated and crude oil prices in Canada were determined by world prices. Shortly after this "deregulation", world crude oil prices fell 58 percent between December 1985 and July 1986. The equivalent net effect on the retail price of gasoline would have been a 28% drop in the price as of January 1986.

ABSTRACT (cont'd)

- Industry sales over all of Canada have averaged $30 billion per year from 1981 to 1985. During this period, net income (profits) has fluctuated around $1.6 billion per year in current dollars. This means that the industry has experienced declining revenues and net income over the past five years in constant dollar terms.

- Over the 1968-82 period, the petroleum industry earned an average annual rate of return on capital employed of 9.9 percent, less than the 10.5 percent rate earned by manufacturing industries. From 1982 to 1985, the industry earned an average annual rate of return on capital employed of 8.0 percent. In many cases, however, the rates of return on capital employed for the petroleum products segment appear to be lower than the rates of return for the consolidated operations of the firm. Published data on profits and rates of return for the refinery component of the business are not available.

- The majority of Ontario's petroleum refineries were in compliance with federal and provincial effluent concentration limits. The MISA program will set discharge limits for a much wider variety of contaminants.

- The future outlook for Ontario's petroleum refining industry sector is uncertain. This is particularly true for the petroleum products segment which has not performed as well financially as the consolidated operations.

RÉSUMÉ

- Les raffineries constituent un secteur vertical de l'industrie. En effet, les principales sociétés pétrolières sont intégrées verticalement.

- Les 28 raffineries en activité au Canada appartiennent à douze sociétés. Six sociétés exploitent actuellement les sept raffineries de l'Ontario. En 1985, celles-ci repésentaient 31 % de la capacité de raffinage au Canada. Les raffineries de l'Ontario sont la propriété de Esso (Imperial), Pétro-Canada, Petrosar, Shell, Suncor et Texaco.

- En 1984, quatre sociétés contrôlaient 75 % de la production totale des raffineries de l'Ontario. On peut donc considérer que ce secteur est concentré.

- En 1985, l'Ontario a consommé 87 % des produits raffinés sur place. Les 13 % qui restent ont été exportés aux États-Unis.

- Les carburants comme l'essence, le carburant d'avion et le carburant diesel constituaient 50 % de la production totale des raffineries de l'Ontario en 1985.

- La consommation de produits pétroliers raffinés en Ontario a fléchi de 21 % entre 1979 et 1983. Elle a cependant augmenté de 4,5 % entre 1983 et 1985. De même, la production annuelle des raffineries de l'Ontario a connu une baisse au cours des sept dernières années, oscillant entre 34,4 millions de mètres cubes et 28,8 millions de mètres cubes (1982). En 1985, la production totale des raffineries de l'Ontario était encore inférieure de 15 % à ce qu'elle était en 1979.

- Entre 1975 et 1985, quatorze raffineries ont cessé leurs activités au Canada, leur nombre passant de 42 à 28.

- En 1985, l'industrie pétrolière canadienne a fait l'objet d'une déréglementation et les cours du pétrole brut au Canada ont été alignés sur les prix mondiaux. Peu après cette « déréglementation », les cours mondiaux ont chuté de 58 %, entre décembre 1985 et juillet 1986. L'effet de cette baisse aurait dû entraîner, dès janvier 1986, une réduction du prix à la pompe de 28 %.

- Le chiffre d'affaires des sociétés canadiennes s'est élevé en moyenne à 30 milliards de dollars par année, de 1981 à 1985. Au cours de cette période, les bénéfices se chiffraient à environ 1,6 milliard par année, en dollars courants. Cela signifie que l'industrie a vu ses revenus et ses bénéfices en dollars constants diminuer au cours des cinq dernières années.

- Entre 1968 et 1982, l'industrie pétrolière a connu un taux de rendement annuel moyen du capital investi de 9,9 %, c'est-à-dire moins que le secteur manufacturier, qui réalisait 10,5 %. De 1982 à 1985, le taux de rendement annuel moyen de l'industrie atteignait 8,0 %. Dans de nombreux cas, cependant, le taux de rendement du secteur des produits pétroliers semble être moins élevé que celui des activités consolidées des sociétés. Les données sur les bénéfices et le taux de rendement des seules activités de raffinage ne sont pas publiées.

- La majorité des raffineries de pétrole de l'Ontario respectaient les règlements provinciaux et fédéraux régissant la limitation des effluents. La SMID limitera les rejets d'un nombre beaucoup plus grand de polluants.

- L'avenir du raffinage en Ontario est incertain. C'est particulièrement le cas du secteur des produits pétroliers, qui n'a pas été aussi rentable que les activités consolidées.

1.0 INTRODUCTION

1.1 The MISA Program

The Municipal-Industrial Strategy for Abatement (MISA) is a major initiative of the Ontario Ministry of the Environment. It is intended to achieve the "virtual elimination of toxic contaminants in municipal and industrial discharges into waterways" (Ontario, Ministry of the Environment, June, 1986:7). The MISA program will encompass 200 industrial establishments in Ontario which discharge wastewaters directly into provincial waterways and are presently identified to be of greatest concern. In addition, 400 municipal sewage treatment plants which receive wastewaters from nearly 12,000 industrial plants will be subject to tighter controls under the MISA program. Eventually, other industrial sectors will be regulated under the MISA program.

As described in the "White Paper" (Ontario, Ministry of the Environment, 1986), the MISA program includes:

1. Development of regulations which will specify monitoring requirements;

2. Development of regulations which will specify effluent limits that are based on "best available technology, economically achievable" (BATEA) or on water quality impacts, whichever is more stringent;

3. Implementation of enforcement activities to ensure that specific monitoring and effluent limits are implemented according to program schedules.

Further details on the MISA program can be found in the "White Paper" (Ontario Ministry of the Environment, June 1986).

1.2 Economic Information Requirements

The monitoring and abatement requirements that may result from this program will likely be costly to achieve and will divert money and effort from other beneficial uses by government and private industry. Consequently, information on the costs of different means of achieving these requirements and their impacts on firms, industrial sectors, municipal governments, and provincial expenditure and staffing requirements is of vital interest to the Ministry of the Environment.

In addition, because the MISA White Paper states that the technology-based effluent limits are expressed as "best available technology, economically achievable", criteria must be developed that defines "economically achievable". Data must then be gathered that will permit assessment of the impacts of the costs of monitoring and abatement in each industrial sector.

Furthermore, where costs of compliance with MISA monitoring and effluent limits regulations might be particularly high, information on the beneficial consequences of the proposed requirements, including reduced risk of human health effects, will be generated for use in decision-making.

A program of economic studies has been initiated to generate this type of information and to complement technical assessments and regulation development efforts. This program is outlined in a report entitled "Economic Information Needs and Assessments for Developing MISA Monitoring and Abatement Requirements" prepared by the Policy and Planning Branch, Corporate Resources Division, Ontario Ministry of the Environment, March, 1987.

The objectives of this economic program are:

a) to develop an economic data base for those industrial sectors which will be subject to MISA monitoring and effluent limits regulations;

b) to develop estimates of the costs of proposed monitoring and effluent limits regulations for each industrial sector and for municipalities;

c) to determine the economic effects and consequences of these costs;

d) to develop criteria with which to define best available technology, economically achievable;

e) to design implementation programs that will achieve the MISA goals and objectives at least cost;

f) to contribute to the design of more effective policies and programs to control sewer uses by industrial dischargers;

g) to provide information about the beneficial consequences of the various monitoring and abatement requirements including changes in the risk of certain health effects.

The present report concerns the development of an economic data base for the industrial sectors which will be subject to MISA requirements. To this end, profiles of the following industrial sectors are being prepared.

1. Petroleum refining
2. Organic chemicals
3. Pulp and paper
4. Iron and steel
5. Metal mining and refining

6. Industrial minerals
7. Electric power generation
8. Inorganic chemicals
9. Metal casting
10. Fabrication - metal, glass, plastics

The industrial profiles are intended to provide the Ministry with background information about the physical and economic dimensions of each industry. Consultants were instructed to obtain their information only from published sources.

While the information in each profile may ultimately be used to help assess the impacts of monitoring and abatement costs on the various sectors and their constituent firms, such analyses were not an objective of the profile reports and are not presented in them.

In addition to the profile reports, each consultant prepared data tables on a PC Lotus 1-2-3 format which can be updated by the Ministry.

The consultants were also given a common outline to follow in preparing their reports.

1.3 Objective of the Summary Report

The present report is intended to provide a summary of the key points in the Petroleum Refinery Sector Profile by Woods Gordon Management Consultants. Moreover, additional information from sources not cited by Woods Gordon, including petroleum industry submissions and federal Petroleum Monitoring Agency data, is also included in the present report.

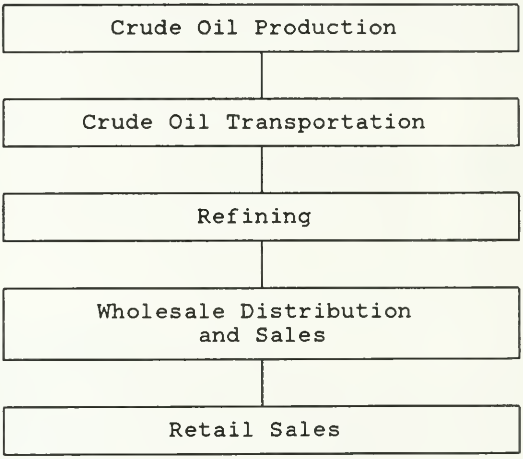
Finally, to give a more complete perspective on this industry, federal and provincial environmental objectives which currently (February 1988) apply to petroleum refineries are cited. An assessment of compliance by the industry with these objectives, which was prepared by Environment Canada, is also summarized.

2.0 STRUCTURE OF THE PETROLEUM REFINING SECTOR

The petroleum refining sector is one component of the vertically integrated, multi-national oil industry, as shown in Figure 1. Most major international oil companies are vertically integrated in that they operate in each level of the business.

FIGURE 1

VERTICAL COMPONENTS OF THE OIL INDUSTRY



The Canadian petroleum refining sector consists of 28 refineries which are owned by 12 different companies. These are listed in Table 1. There are seven refineries in Ontario which are owned by six companies as listed in Table 2. All of these Ontario establishments will be subject to MISA requirements.

As of 1985, Petro-Canada was the largest refiner in Canada, in terms of crude oil "charge" capacity, following the acquisition of Gulf Canada's downstream (refining and marketing) operations. Esso Petroleum and Shell Canada Products are the two next largest refiners. These three firms account for 175,460 cubic metres per day or 56% of total Canadian petroleum refining capacity.

In 1985, the seven Ontario refineries accounted for 31% of total Canadian crude oil processing capacity. Petrosar Ltd. operates a refinery in Corunna which was originally designed to process 27,820 cubic metres (m^3) of crude oil each day. This complex was acquired by Polysar Ltd. in May 1985. As a result of an on-going

TABLE 1
CANADIAN REFINERIES AND CRUDE CAPACITIES
1985

COMPANY	NO. OF REFINERIES	TOTAL DESIGN CAPACITIES (m^3/day)
Petro-Canada	7	66,470
Esso Petroleum	5	66,000
Shell Canada Products	5	42,990
Irving Oil	1	37,670
Texaco Canada	2	18,280
Ultramar Canada	1	16,380
Suncor Inc.	1	14,300
Petrosar	1	9,500*
Consumers Coop.	1	6,840
Chevron Canada	1	5,560
Husky Oil	2	5,250
Turbo Resources	1	4,390
Companies 12	Refineries 28	Capacity of 293,630

TABLE 2
ONTARIO REFINERIES AND CRUDE CAPACITIES
1985

COMPANY	LOCATION OF REFINERIES	DESIGN CRUDE OIL PROCESSING CAPACITY (m^3/day)
Petrosar	Corunna	9,500*
Petro-Canada	Clarkson) Trafalgar)	22,340
Esso Petroleum	Sarnia	19,600
Texaco Canada	Nanticoke	15,100
Suncor Inc.	Sarnia	14,300
Shell Canada Products	Sarnia	11,290
Firms 6	Refineries 7	Capacity of 92,130

* Refinery design capacity down-sized from 27,820 m^3/day to 9,500 m^3/day.

Source: Oilweek Magazine, June, 1986, page 12.

program to produce a greater variety of petrochemical feedstocks and products from crude oil inputs, the operational capacity of the plant has been officially "down-sized" to 9,500 m³ of crude oil per day. Only about 20% of this refinery's output consists of fuels but Petrosar sells residual fuel oil, distillates and diesel fuels in competition with other oil companies. Gasoline is sold or traded to other refineries. Petrosar's product mix is, therefore, concentrated in the production of organic chemicals.

Ninety-six percent of the crude oil input to refineries in Ontario comes from Western Canada. U.S. sources provide 3.6% while Southwestern Ontario oil fields account for the remaining 0.4%.

As shown in Figure 2, four companies account for just over 61% of the value of shipments of petroleum products in Canada, while eight firms account for 86% of the total value of shipments. In Ontario, four companies controlled 75% of the total refinery capacity during 1984.

These facts have led some authorities to characterize the oil industry as an oligopoly. In theory, this means that there are so few sellers in the relevant market that individual producers must take account of other firms' actions in making business decisions. In an oligopolistic situation, competition among major companies may be limited if firms possess market power as a result of this market structure and if demand for products is inelastic. Companies in an oligopolistic market would also be better able to pass cost increases along as higher product prices.

Competition in the oil industry has been the subject of long debate here in Canada as well as in the U.S. Canadian government studies have not found evidence of collusion or pricing agreements in the Oil Industry. Most recently, a 3-volume report by the federal Restrictive Trade Practices Commission (RTPC) (1986) identified several factors which can generate competitive pressures on prices, especially at the refinery level. These factors include high fixed costs, excess capacity (in the short term), alternative fuels, limited storage capacity and slow growth or absolute declines in the demand for some petroleum products. The Commission also found that Ontario, where the top four firms controlled 75% of the total capacity in 1984, actually had the least concentrated market among the five regions examined.

Since 1970, refinery capacity has been reduced by 128,100 m³/day due to various refinery closures across Canada (Canadian Petroleum Association, 1985; Table VIII-5). Current capacity amounts to 293,630 m³/day.

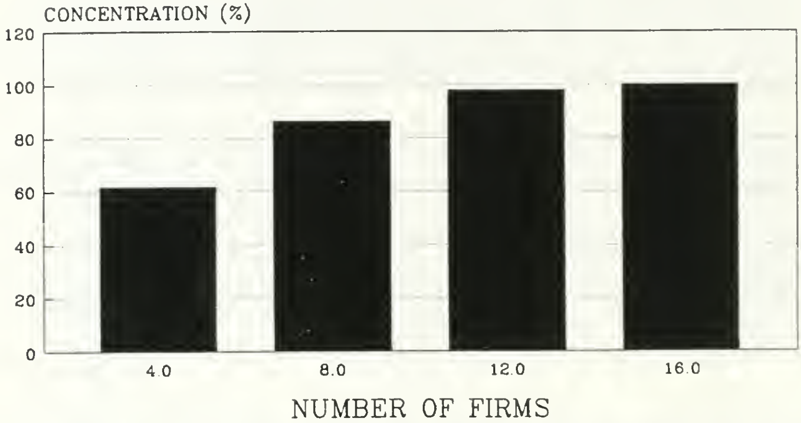
While the RTPC found no evidence of collusion in any component of the oil industry, it did note that additional refinery closures could make the industry less competitive in the future.

Dismantling of the National Energy Program (NEP) and the subsequent deregulation of oil prices in Canada has introduced new competitive pressures as offshore producers can now export petroleum products freely into Canada.

Finally, about 55% of the total revenues from oil companies in Canada are foreign owned, of which 40.2% is U.S. owned. Of the 45% of the Canadian owned oil industry revenues, 16% is owned by the public sector (Petroleum Monitoring Agency, 1987, p. 5-2). This ownership pattern further demonstrates that oil companies operate in national or international, rather than provincial, market levels and are thus subject to international competitive pressures.

FIGURE 2

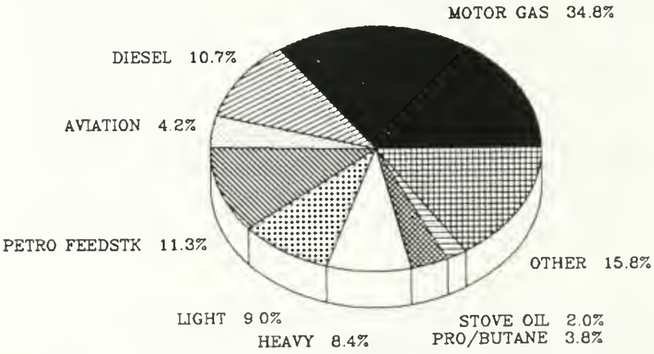
CONCENTRATION OF SHIPMENTS
PETROLEUM REFINING SECTOR
CANADA, 1982



SOURCE: STATISTICS CANADA
CATALOGUE 31-402

FIGURE 3

PETROLEUM PRODUCTS
ONTARIO, 1985



SOURCE: STATISTICS CANADA
CATALOGUE 45-004

3.0 PRODUCT MIX

Refineries process crude oil to make a wide range of products. Total Ontario refinery production amounted to 30,258,000 m^3 during 1985 (Energy, Mines and Resources, annual, Tables 3, 19-30). Annual refinery output has declined during the period 1979-85 from a high of 34,443,000 m^3 of products in 1979 to a low of 28,772,000 m^3 during 1982. In 1985, Ontario product production amounted to about 31% of total Canadian oil product output (Statistics Canada, 45-004; Table 1).

Figure 3 shows the distribution of petroleum product output from Ontario during 1985. Nearly 50% of Ontario's refinery production is transportation fuels; gasoline, diesel and aviation fuels. Sixty percent of the national petroleum output is made up of these fuels. Heating fuels make up 20% of Ontario refinery production while 11% is petrochemical feedstocks (Statistics Canada, 45-004; Table 1).

Product consumption in Ontario for 1985 was 87 percent of refinery production in the province. Most of the remaining 13 percent was exported to the U.S.

Figure 4 shows that the value of shipments (i.e. value of production less inventories) from both the Canadian and the Ontario refining industry has been steadily increasing since 1977. In 1984, the total value of petroleum shipments for all of Canada reached over $24 billion. Over $9 billion, or 38% of those shipments arose in Ontario. The value of Ontario shipments of petroleum products amounted to 6% of the provincial income during 1985.

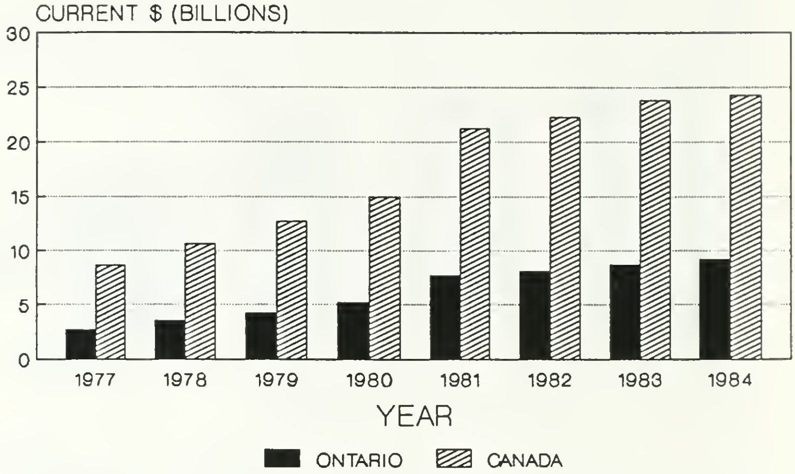
The fact that the value of shipments has been rising steadily in the face of fluctuating and even declining production means that product prices including taxes have, on average, been rising steadily since 1977.

Petroleum specialists at the federal Department of Energy, Mines and Resources have estimated that demand for gasoline, like cigarettes, is inelastic with respect to price in the short run. This means that a price increase will not engender a proportionate decrease in the amount of product consumed. From the industry's point of view, if demand for a product is price inelastic, prices can be increased without incurring substantial reductions in sales and revenues.

Over the longer run, say 2-5 years, demand may be more price elastic because consumers have more opportunities to find cheaper substitutes, adjust their lifestyles to lower energy consumption or install more energy efficient equipment. If demand is price elastic, a 1% increase in the price of the product would induce buyers, in the aggregate, to reduce the quantity of

FIGURE 4

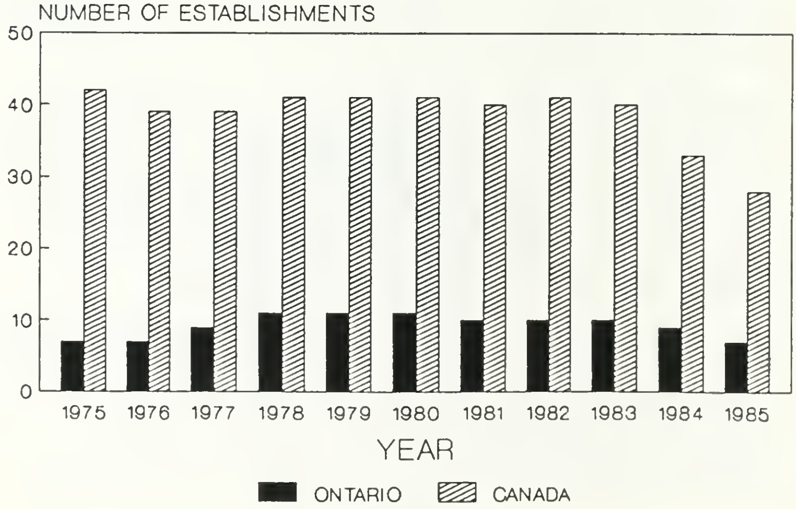
VALUE OF SHIPMENTS
PETROLEUM REFINING SECTOR
ONTARIO & CANADA, 1977-1984



SOURCE: STATISTICS CANADA
CATALOGUE 31-203

FIGURE 5

PETROLEUM REFINING ESTABLISHMENTS
CANADA & ONTARIO, 1975-1985



SOURCE: STATISTICS CANADA
CATALOGUE 31-203

their product purchases by more than 1%. If this happens, a firm could incur a reduction in revenues, and depending on cost conditions, a possible reduction in profits. According to Sahi and Erdmann (1978), the long-term demand for light fuel oils is relatively price elastic.

4.0 INDUSTRY TRENDS

As noted earlier and shown in Figure 5, the Canadian Petroleum industry has undergone significant "downsizing" in light of declining demand for refinery products. Since 1975, 14 refineries have been shut down; 12 of those since 1983. Moreover, 128,100 m^3/day of refinery capacity has been closed since 1970. However, between 1975 and 1985, only four refineries were closed in Ontario. The refineries that remain are larger and more efficient.

Between 1973 and 1980, crude oil prices were regulated by the Canadian government and held below world prices. From 1980 to 1985, the National Energy Program further imposed a complex series of subsidies, taxes and price controls which allowed Canadian crude oil prices to reach world price levels by 1985. In 1985, the Canadian oil industry was effectively deregulated and crude oil prices in Canada were determined by world reference prices. However, late in that year, world oil prices began to fall precipitously.

According to the Petroleum Monitoring Agency of the Department of Energy, Mines and Resources Canada (1987), crude oil prices to Canadian producers dropped from an average of $33 per barrel in January 1986 to an average of $14.60 per barrel in July 1986. Prices rose again and stabilized in the range of $20 to $22 per barrel by the end of 1986.

The crude oil price declines reduced the major cost component to refineries. Consequently, the crude oil cost to refineries at Sarnia dropped from 24.4¢ per litre in December 1985 to 10.3¢ per litre in July 1986, a 58% drop (Dept. Energy, Mines and Resources, 1987, Table 7.3). If the full 58% crude oil price drop were passed on to retail prices, the retail price of gasoline could fall by as much as 28%. In fact, according to figures from the Department of Energy, Mines and Resources and cited by Woods Gordon (1987, p. 24), the average price of home heating oil and regular leaded gasoline in Ontario fell by an average of 20%.

An oil company spokesperson provided the following perspective regarding crude oil and petroleum product price changes. Between December 1985 and July 1986, gasoline prices dropped from a range of 48¢ to 52¢ per litre to a range of 36¢ to 42¢ per litre. During that same period, the crude oil reference price declined from

26¢ per litre to 12¢ per litre, a 14¢ or 54% drop. The price of gasoline would not be expected to drop by more than the reduction in the crude oil cost or 14¢/litre. Using 52¢/litre as a benchmark gasoline price, the price could decline by as much as 14¢/litre, to 38¢/litre; a 27% drop. However, between December 1985 and July 1986, gasoline prices were actually reduced by 9.5¢ per litre or 19%.

Figures 6a and 6b show that falling crude oil prices and retail gasoline prices have resulted in increases in the proportion of the retail price going to refineries, dealers, and taxes. Lower crude oil prices should, therefore, enhance the financial performance of the refining sector of the oil business. Based on the figures noted above, the gross margins between crude oil and gasoline prices rose from 23.6¢ - 27.6¢ to 25.7¢ - 31.7¢ per litre.

Figure 6c which shows the difference between a weighted average of petroleum product prices (excluding taxes) and the average price paid by Canadian refineries, in cents per litre, gives a somewhat different perspective (Petroleum Monitoring Agency, 1987). In early 1986, product prices fell before high cost product inventories were used up. While there was a bit of a squeeze on this margin during this transition period, by June 1986 margins had exceeded the levels attained in 1985. These improved margins were maintained during 1986 and, according to the Petroleum Monitoring Agency (1987), resulted in an average return on capital employed of 6.7% to the refining and marketing segments of the industry for 1986 as a whole. Thus, falling crude oil prices resulted in higher returns to the refining component of the business.

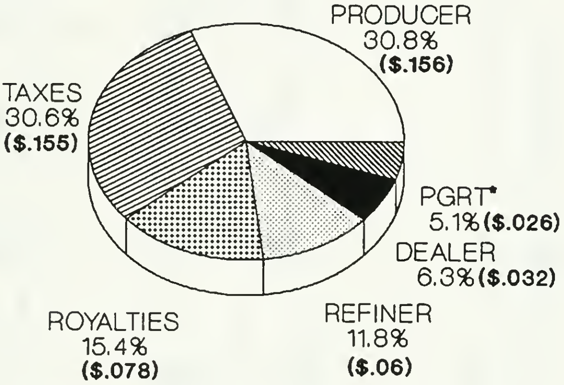
Industry representatives have reported that the petroleum refineries in Canada and Ontario face major capital expenditure requirements over the next five years for the following purposes:

- environmental and workplace health and safety improvements,
- equipment to process heavier, "sour" (containing more sulfur) crude oil,
- equipment to produce lower sulfur, higher quality products, especially diesel fuel, gasolines and jet fuels.

Total capital expenditures for Standard Industrial Code (SIC) 36 ("petroleum and coal") products ranged between $2.4 billion and $3.9 billion from 1981 to 1985 (Statistics Canada 61-003). Capital expenditures have been cut back in 1985 and 1986, partially as a result of the oil price declines.

FIGURE 6a

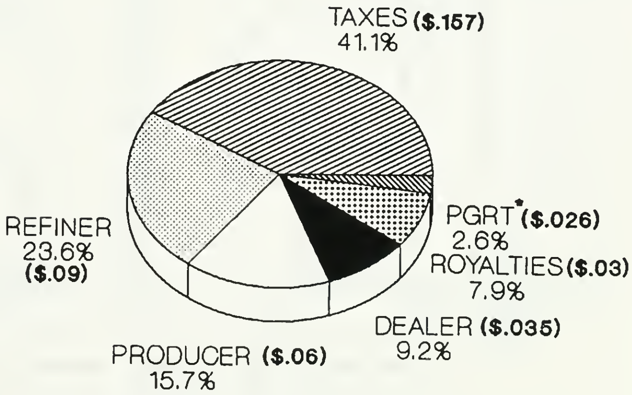
RETAIL GASOLINE PRICE STRUCTURE
TORONTO REGION, JANUARY 1986
(PRICE = 50.7 CENTS PER LITRE)



SOURCE: LOEWEN, ONDAATJE, McCUTCHEON;
A NEW ERA OF GROWTH

FIGURE 6b

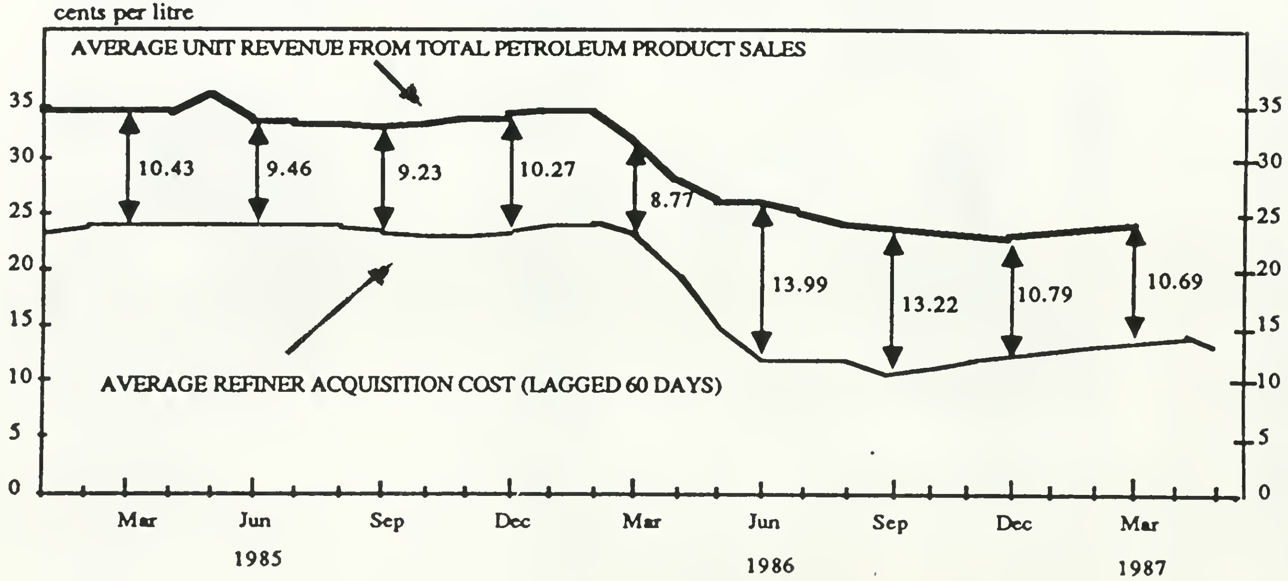
RETAIL GASOLINE PRICE STRUCTURE
TORONTO REGION, APRIL 1986
(PRICE = 36.2 CENTS PER LITRE)



* PETROLEUM AND GAS REVENUE TAX
SOURCE: LOEWEN, ONDAATJE, McCUTCHEON;
A NEW ERA OF GROWTH

Figure 6c

CANADIAN ACQUISITION COSTS VS. PRODUCT PRICES



SOURCE: Energy, Mines and Resources Canada, Oil Branch

Table 3

NUMBER OF ESTABLISHMENTS, EMPLOYMENT AND EARNINGS FOR THE OIL INDUSTRY IN CANADA AND ONTARIO
1975 - 1984

		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Establishments											
(#)	Canada	42	39	39	41	41	41	40	41	40	33
	Ontario	7	7	9	11	11	11	10	10	10	9
Employment											
(#)	Canada	15,624	15,105	16,464	18,958	18,037	18,743	21,325	20,155	17,557	15,847
	Ontario	8,594	8,759	9,223	10,515	10,129	10,597	12,261	11,447	10,256	8,761
Salaries & Wages											
($000)	Canada	277,268	298,260	353,981	427,950	450,330	515,911	657,519	734,016	719,728	689,436
	Ontario	160,702	180,981	209,877	245,640	258,635	293,251	385,940	431,003	451,932	389,986

Source: Statistics Canada
Catalogue 31-203

Table 4

PRINCIPAL STATISTICS OF MAJOR CANADIAN OIL COMPANIES WITH REFINERIES IN ONTARIO*
1985

($ Millions)

COMPANY	SALES	ASSETS	AFTER-TAX PROFIT	CAPITAL EXPENDITURES
Esso Petroleum	8,667	9,202	634	1,158
Shell Canada Products	6,070	5,799	146	469
Petro-Canada	5,300	8,846	(691)[1]	711
Texaco Canada	4,212	3,631	336 [2]	762
Suncor Inc.	1,466	2,390	(10)[3]	317
Petrosar[4]	N/A	N/A	N/A	N/A
Petroleum and Coal Prod. Industry	29,376	31,594	1,590	2,790

* Statistics refer to consolidated company operations.

[1] In 1985, Petro-Canada had an extraordinary item of $865 million due capital acquisitions.

[2] In 1985, Texaco had an extraordinary item of $101 million.

[3] In 1985, Suncor had an extraordinary item of $56 million.

[4] Petrosar does not issue separate financial statements

Source: Company Financial reports; Statistics Canada Catalogue 61-003

5.0 FINANCIAL PERFORMANCE

5.1 The Petroleum Industry

The Canadian oil industry controls more than $32 billion in consolidated assets and generates about $3 billion in cash flow each year. Peak employment in the oil industry amounted to 21,300 in all of Canada and 12,3000 in Ontario, both during 1981. Table 3 shows that petroleum refineries alone employed about 9,000 people in Ontario and 16,000 people Canada-wide during 1984.

Ontario's refineries generated more than $9.2 billion in revenues in 1984 or 38% of the $24.3 billion in refinery revenues for all of Canada (Statistics Canada, 31-203).

Aggregate financial data for the "petroleum and coal products" sector (SIC 36) show sporadic growth over the period 1981 to 1985. The refining sector (SIC 364) accounts for 98% of the total value of shipments for the petroleum and coal products sector in Canada. The value of shipments in the entire Canadian SIC 36 sector (petroleum and coal products) peaked at $31.3 billion in 1982 and was recorded at $29.4 billion in 1985.

The Restrictive Trade Practices Commission reported that the consolidated rate of return on capital employed (i.e. net profit after-tax plus after-tax interest expense divided by total assets less current liabilities) for the petroleum and coal products sector averaged 9.9% per year over the 1968-82 period. This is less than the 10.5% earned by manufacturing as a whole and only one percentage point better than the 8.9% available on 3-5 year government bonds over the 1968-82 period.

More recently, the petroleum industry as a whole has recorded somewhat lower rates of return. Statistics Canada reports that between 1981 and 1985, the return on capital employed for the consolidated petroleum and coal products sector ranged from 7.0% (1983) to 9.4% (1981) while achieving 8.7% in 1985. The return on total consolidated assets, which, for this industry, amounts to about $32 billion, has ranged from 5.2% (1983) to 7.3% (1981) (Statistics Canada, 61-003). In 1985, the industry achieved a 6.8% return on consolidated assets.

The dramatic decline in crude oil prices during 1986 had equally dramatic effects on the oil industry. According to the Petroleum Monitoring Agency, the Canadian oil industry sustained a $5.5 billion decline in net revenues (to a $2.6 billion loss) between 1985 and 1986. This occurred despite an increase of $592 million (to $807 million) to the refining and marketing segments of the business (Petroleum Monitoring Agency, 1987; Appendix A-8). These results are indicative of the fact that better than 90% of the Canadian industry's net revenues were derived from crude oil sales.

The Petroleum Monitoring Agency publishes rates of return on capital employed for "downstream" operations which include refining, distribution and retail sales facilities but exclude petrochemical operations. The five-year average return on capital employed for downstream operations, ending in 1986, was 3.0% as opposed to 4.4% for the total operations and 6.2% for upstream (crude oil production) operations (Petroleum Monitoring Agency, 1987, Appendix A-10). During 1986, downstream operations achieved a 6.7% return on capital in contrast to losses of 0.9% and 0.7% on upstream and total operations respectively.

These more recent results are in contrast to a more favourable return on capital of 10.5% that was earned by downstream operations in 1981. During that same year the total industry registered a 7.7% rate of return.

Data from Statistics Canada indicate that the oil industry has not been performing as well as other non-financial industries in recent years. With losses sustained in 1986 because of lower oil prices, the five-year average return on consolidated shareholders' equity for the oil industry amounted to 5.6% as compared with 8.9% on all other non-financial industries and 9.4% for manufacturing industries alone (Statistics Canada, 61-003). Similarly, the five-year average return on capital employed (ending in 1986) for the oil industry in Canada was 5.2% as compared with 7.2% for other non-financial industries and 7.9% for all manufacturing industries.

There are no published data on the financial performance of individual refineries in Ontario. However, the refining segment of the industry appears to have benefited from recent oil price trends although the oil industry suffered substantial losses in its consolidated operations.

5.2 Comments on Individual Companies

Principal statistics for 5 of the 6 oil companies in Ontario are summarized in Table 4.

Comments on individual companies set out below were derived from companies' consolidated annual reports and from written submissions by the firms.

Esso Petroleum (Imperial Oil)

Refining and marketing facilities account for about one-third of Imperial Oil's fixed assets. Imperial's market share has been stable over the past number of years.

Recent bright spots for the company include increased exports to the U.S. and stronger sales of aviation and diesel fuel. Unlike the rest of the industry, Imperial

Oil experienced relatively strong sales growth of 10.9 percent between 1981 and 1985.

Imperial Oil's consolidated performance in 1986 was affected by falling oil prices. Total corporate earnings (profits) in 1986 were down to $440 million from $694 million in 1985. However, earnings from petroleum products alone was up to $174 million in 1986, a 70% increase over the $102 million profits achieved in 1985. In fact, 1986 saw the best performance in this component of the business in the past five years.

Petro-Canada

Major acquisitions of refining and retail operations from BP and Gulf Oil contributed to strong output growth by Petro-Canada. However, also heavy write-downs of assets on the east coast and in the Arctic pushed earnings into the negative numbers during 1985. The company closed part of its operations at the Clarkson refinery in 1985.

Aggressive acquisitions pushed the value of Petro-Canada's sales up 100 percent between 1981 and 1985. Nevertheless, profitability remained weak, even by industry standards.

Petrosar

In 1974, Petrosar Limited was incorporated, with the shareholders being Polysar Limited, Dupont Canada Inc., and Union Carbide Canada limited. In 1985, Polysar Limited acquired 100% of Petrosar Limited. Polysar Limited is wholly owned by Polysar Energy and Chemical Corporation.

Petrosar's facilities produce primary petrochemicals such as ethylene, propylene, butadiene, iso-butylene, n-butylene, benzene, and toluene/xylene mixes. Coincident with this petrochemical production, some fuel co-products result including synthetic natural gas, liquified petroleum gas, gasoline components, diesel fuel, home heating oil, and heavy residual fuel oil. Some of these fuel products are marketed by Petrosar but gasoline is sold or traded directly to other refiners.

The last public issue of financial statements for Petrosar was in 1981. Polysar Limited issues only consolidated financial statements for all its domestic and foreign operations and does not disaggregate its refining operation. Therefore, there is no financial information specific to Petrosar.

Shell Canada Products

Shell made gains in market share in 1985 which allowed its refineries to operate at 90 percent capacity. The company closed a refinery at Bronte (Oakville) in 1983.

Shell Canada experienced a healthy rate of consolidated sales growth (27.8 percent) between 1981 and 1985, much better than the industry average. Corporate profitability, however, was slightly below the average for the sector.

Suncor

Although output and sales of refined products by this firm have fallen since 1981, the product mix has changed dramatically from heavy fuel and heating oil to high-value products such as gasoline and liquefied petroleum gases.

Suncor was the only company studied that showed better corporate performance results during the recessionary 1982-84 period than in 1981 or 1985.

Texaco Canada

Texaco closed three refineries between 1979 and 1984. The two remaining refineries at Nanticoke and Halifax could, therefore, run at essentially full capacity.

An $80 million project recently completed allows the Nanticoke refinery to produce more unleaded gasoline, butane and propane and less residual fuel oil.

Although Texaco's sales decreased in 1985, following three years of growth, the company achieved corporate rates of return on capital above 12 percent through out the period 1981-85.

5.3 Company Performance Measures

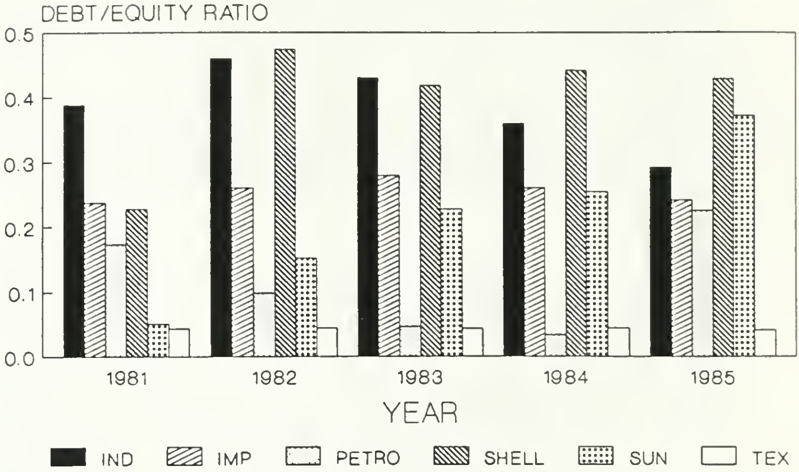
As noted, the financial performance measures noted above reflect the entire Canadian petroleum business, not just the refining sector. Similarly, corporate profitability may not reflect the performance of a particular business segment such as the refining operations of the firm. In this section, the corporate or consolidated performance measures for each firm will be contrasted with measures for the refining and petroleum marketing segment of each company.

The debt-equity ratio (short-term and long-term debt divided by shareholders equity) indicates the amounts of capital relative to debt carried by the firm. A lower ratio indicates greater protection for the creditors, greater borrowing flexibility and is more desirable. Figure 7 shows that the average industry ratio has been declining. Texaco Canada and Petro Canada have registered the lowest corporate ratios in recent years.

The return on capital employed (net profit or earnings plus interest expense plus extraordinary items, divided by total assets less current liabilities) is a measure

FIGURE 7

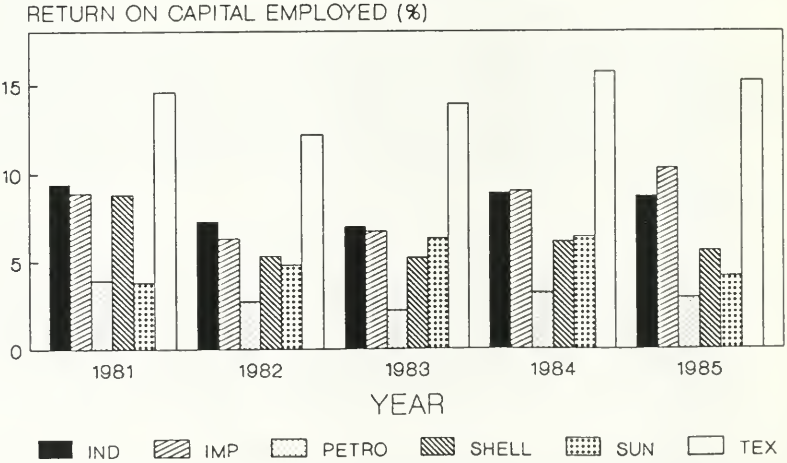
DEBT/EQUITY RATIO
PETROLEUM SECTOR, 1981-1985



SOURCE: COMPANY FINANCIAL STATEMENTS
CONSOLIDATED OPERATIONS

FIGURE 8

RETURN ON CAPITAL EMPLOYED
PETROLEUM SECTOR, 1981-1985



SOURCE: COMPANY FINANCIAL STATEMENTS
CONSOLIDATED OPERATIONS

of management performance and reflects how well assets have been employed to generate return and profit. The higher the return the better. Figure 8 shows that Texaco Canada corporate returns have consistently exceeded the industry average which ranged from 7.0% to 9.4%. The industry average has recorded steady growth during the period 1982-1985.

Before-tax profit is the surplus that remains after deduction of the cost of labour, materials as well as interest, selling, administration and other expenses associated with the production of goods for sale. This measure indicates the fundamental efficiency of the operation and its ability to generate profits.

After-tax profit or net income is the surplus remaining after all current expenses, interest, charges and taxes are paid, except non-recurring "extraordinary" items. This is a primary measure of the long term financial health of a company and an industry. After-tax profit sometimes includes tax credits or deferred taxes not directly related to sales or cost efficiencies. Figure 9 shows that the Canadian petroleum industry, and the consolidated operations of Imperial Oil and Texaco Canada have shown steady after-tax profit growth in nominal (current dollar) terms since 1983.

Cash flow (after-tax profit plus depreciation and deferred income taxes) is an indication of the ability to pay current expenses, declare dividends and finance expansion. A company which shows little or no after-tax profits can, for a time, still meet its debts and obligations if cash flow from other sources is adequate. The larger the cash flow, the better. Figure 10 shows that Imperial Oil has generated the largest cash flow in the industry while Petro Canada incurred a negative cash flow in 1985 as the result of writing off losses from offshore exploration activities.

The major oil companies' annual reports contain disaggregated financial information on the petroleum products segment of their business. However, the profit data reported for these business segments are before-tax, rather than after-tax earnings. The exception is Petrosar. Only consolidated financial data for Polysar are available.

In cases where data are available, the annual rates of before-tax return on capital employed for the petroleum products segment appear to be lower than the rates of return recorded for the company's consolidated operations. For example, the unweighted average rate of return on capital employed for the petroleum products segment of Imperial Oil was 4.0% over the 1983 to 1985 period as opposed to 8.7% for the consolidated operations of the entire firm. This rate return improved to 7.6% in 1986 versus a 6.3% for the consolidated operations (Imperial Oil, 1986).

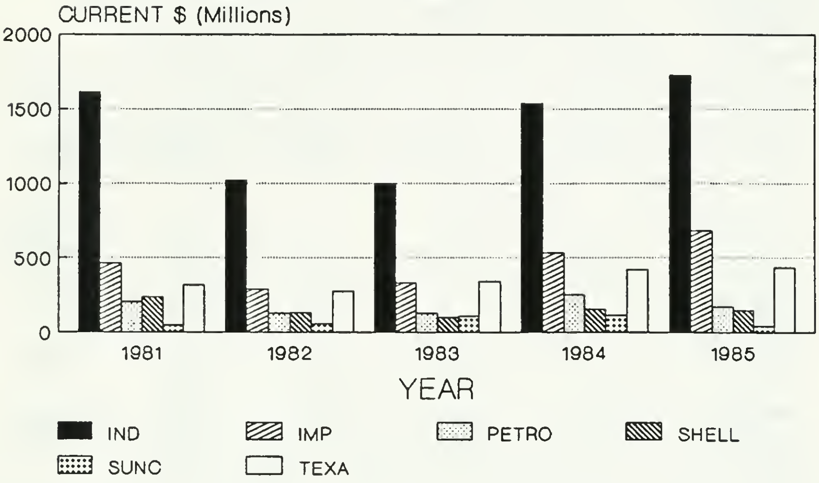
Suncor recorded a loss of 0.5% on capital employed for their petroleum products segment over the 1983-1985 period versus a 5.6% return on capital for the consolidated operations. Shell Canada had a 1.9% return on assets for the petroleum products segment compared to a 4.5% return on assets for consolidated operation while Texaco Canada had a loss of 0.4% on assets while earning an 11.0% return on assets for the consolidated operation.

On the other hand, based on figures reported in their annual report, Petro-Canada recorded a 9.0% operating profit on assets over the 1983 to 1985 period for their petroleum products segment, compared to a loss of 0.9% on assets from the overall, consolidated operations of the firm. However, the operating profit reported for the refined oil products segment does not include certain corporate over-head expenses, consequently, the operating profit for the petroleum products segment during that period is actually lower than indicated.

From 1985, when over-head expenses were allocated among operating segments, return on assets has ranged from a loss of 0.9% in 1985 to a high of 4.3% in 1986. The average return on assets for the 3 year period (1985 to 1987) was 2.9%.

FIGURE 9

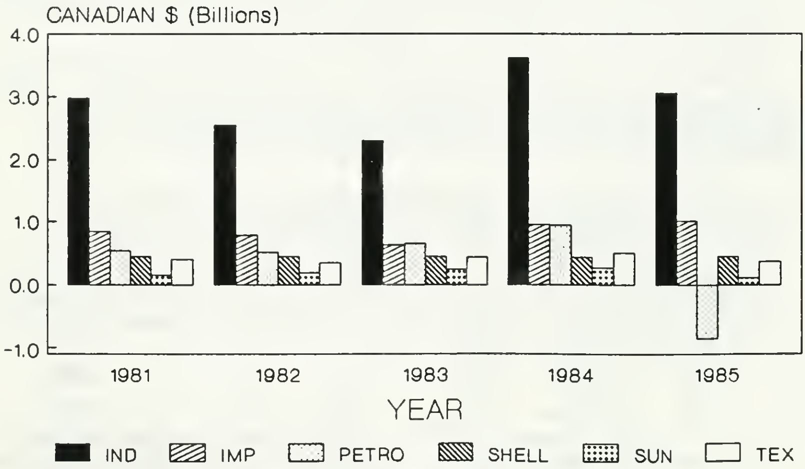
AFTER-TAX PROFIT
(BEFORE EXTRAORDINARY ITEMS)
PETROLEUM SECTOR, 1981-1985



SOURCE: COMPANY FINANCIAL STATEMENTS

FIGURE 10

CASH FLOW
PETROLEUM SECTOR, 1981-1985



SOURCE: COMPANY FINANCIAL STATEMENTS
CONSOLIDATED OPERATIONS

6.0 ENVIRONMENTAL STATUS OF THE INDUSTRY

6.1 Guidelines and Regulations

Environment Canada completed an assessment of the industry's compliance with Federal Refinery Effluent Regulations and Guidelines during the years 1983-84 (Geadah, December 1987). The Canadian Petroleum Refinery Effluent Regulations apply to refineries that commenced operations on or after November 1, 1973 while refineries in operation prior to this date are subject only to the guidelines. Regulations have statutory authority while guidelines are suggested standards of good practice. Failure to comply with a guideline is not, in itself, an offence.

According to Environment Canada, federal regulations and guidelines are based on the best practicable treatment technology (BPT). Neither the guidelines nor the regulations specify particular technologies but are established to induce firms to control their effluents to that degree (Geadah, December 1987, p. 22).

The regulations and guidelines specify limits for the deposit of five major contaminants into surface waterways. The maximum allowable "deposits" or discharges for all parameters are shown in Table 5. Limits set in the regulations are 50% lower than those set in the guidelines.

6.2 National Assessment

In 1983, the Canadian petroleum refining sector was in compliance with the monthly limits of the Federal Guidelines 92% of the time, with the one-day limits 98% of the time, with maximum daily amounts 97% of the time, and with the stormwater limits 92% of the time (Geadah, December 1987, p 37). A regional breakdown of compliance with monthly amounts subject to guidelines by parameter is shown in Table 6. The Quebec, Western and Northern Regions exceeded these monthly limits most frequently in 1983. Ontario had the best compliance performance with the monthly limits.

In 1983, Canadian refineries that were subject to Federal Regulations were in compliance with monthly limits 97% of the time, with daily limits 99.6% of the time, and with limits on stormwater flows 100% of the time (Geadah, December 1987, p. 38). Ontario refineries were in compliance 100% of the time with respect to all five monthly average parameter limits during 1983 (Geadah, December 1987, p. 46).

In 1984, there was a slight improvement in pollution discharge performance for all new Canadian refineries. They were in compliance with monthly requirements of the regulations 98% of the time, 100% with the one-day and stormwater limits, and 99.9% for maximum daily limits.

Table 5

FEDERAL GUIDELINES AND REGULATIONS REGARDING AMOUNTS OF MAXIMUM ALLOWABLE DEPOSITS OF CONTAMINANTS FROM PETROLEUM REFINERIES(1)

	Monthly Amount $lb/10^3\ bbl \cdot d^{-1}$ ($kg/10^3\ m^3 \cdot d^{-1}$) of crude oil		One-day Amount $lb/10^3\ bbl \cdot d^{-1}$ ($kg/10^3\ m^3 \cdot d^{-1}$) of crude oil		Maximum Daily Amount $lb/10^3\ bbl \cdot d^{-1}$ ($kg/10^3\ m^3 \cdot d^{-1}$) of crude oil	
Substance	Guidelines	Regulations	Guidelines	Regulations	Guidelines	Regulations
Oil and Grease	6.0 (17.1)	3.0 (8.6)	11.0 (31.4)	5.5 (15.7)	15.0 (42.8)	7.5 (21.4)
Total Suspended Matter	14.4 (41.1)	7.2 (20.5)	24.0 (68.5)	12.0 (34.2)	30.0 (85.6)	15.0 (42.8)
Phenols	0.6 (1.7)	0.3 (0.9)	1.1 (3.1)	0.55 (1.6)	1.5 (4.3)	0.75 (2.1)
Sulphide	0.2 (0.6)	0.1 (0.3)	0.6 (1.7)	0.3 (0.9)	1.0 (2.9)	0.5 (1.4)
Ammonia Nitrogen	5.0 (14.3)	3.6 (10.3)	8.0 (22.8)	5.7 (16.3)	10.0 (28.5)	7.2 (20.5)
pH					6.0 to 9.5	
Toxicity					No more than 50% fish mortality	

Note: The regulation and guideline limits are in imperial units only; metric units in brackets have been rounded (1, Schedule 1).

Source: Geadah, Environmental Status Report for the Canadian Petroleum Refining Industry, 1987

Table 6

PERCENT COMPLIANCE OF REFINERIES IN EACH REGION WITH MONTHLY AVERAGE LIMITS AS SET IN THE GUIDELINES (1983)

	% of Time in Compliance with the Guidelines					
Region	Oil and Grease	Total Suspended Solids	Phenols	Sulphide	Ammonia Nitrogen	Average
Atlantic	95	95	95	100	95	96
Quebec	52	66	90	98	87	79
Ontario	98	96	100	100	100	99
Western & Northern	89	88	91	92	85	89
Pacific & Yukon	96	97	91	96	95	95
Canada	86	88	93	97	92	92

Source: Geadah, Environmental Status Report for the Canadian Petroleum Refining Industry, 1987

TABLE 7
EFFLUENT QUALITY OBJECTIVES FOR PETROLEUM REFINERIES (ONTARIO)

Substance	Maximum Concentration (mg/L)
Oil and Grease	10
Phenols	0.020
Suspended Solids	15
Ammonia Nitrogen	10
Chemical Oxygen Demand	200
Chromium	1
Copper	1
Nickel	1
Lead	1
Zinc	1
pH Levels	5.5 to 9.5
Toxicity*	No more than 50% fish mortality for process effluent, once-through cooling water and treated stormwater.

* A 24-hour static bioassay test conducted by refinery and 96-hour static bioassay conducted by Environment Canada and the Ministry of the Environment.

Source: Geadah, Environmental Status Report for the Canadian Petroleum Refining Industry, 1987.

TABLE 8
ONTARIO PETROLEUM REFINERIES STATUS
(All Loadings in Kilograms Per Day)
1986

	AMMONIA-NITROGEN	OIL AND GREASE	TOTAL SUSPENDED SOLIDS	PHENOLICS
Esso Petroleum @ Sarnia	14.1	80.15	395.1	.21
Petro-Canada @ Clarkson (Gulf)	41.2	89.5	148.8	.34
Petro-Canada @ Oakville	49.8	9.13	93.5	.298
Petrosar @ Corunna	15.26	4.17	29.9	.030
Shell @ Corunna	2.73	118.7	371.1	.18
Sunco @ Sarnia	33.25	72.83	362.8	.35
Texaco @ Nanticoke	1.51	2.68	1.59	.008
TOTALS	157.85	377.2	1,402.8	1.416

Source: MOE, Report on the 1986 Industrial Direct Discharges in Ontario, 1987.

Of the 34 refineries that were assessed in 1983, 12 were in compliance with all of the specified limits more than 99% of the time and five were in compliance between 95% and 99% of the time. Of the remaining 17 refineries, five provided further treatment off-site, five improved their performance in 1984, and three others were decommissioned.

6.3 Ontario Assessment

The Province of Ontario has established guidelines for petroleum refineries which are consistent with federal legislation, although limits are expressed in concentrations rather than loadings per unit of production. Table 7 shows the concentrations limits of major substances. In 1983, Ontario refineries were in compliance with monthly guidelines 99% of the time. In 1984, refineries were in compliance with monthly limits 94% of the time (Geadah, December 1987, p. 69).

The majority of Ontario's petroleum refineries meet all effluent concentration limits set by the federal and provincial governments as well as U.S. EPA category limits (MOE, October 1987, p. 24). Table 8 shows the 1986 discharge loadings of four major groups of contaminants from refineries in Ontario. Figure 11 displays the total loadings of four major parameters for all refineries in Ontario from 1982 to 1986. Total refinery production increased from 1983 to 1984 by 6.7%. Loadings of oil and grease and total suspended solids also increased during that period. Moreover, when petroleum product production in Ontario declined in 1985, oil and grease and ammonia loadings declined also, although suspended solids increased substantially in 1985 over 1984. There is an indication that these pollution parameters vary with sector output but there are insufficient data to establish a statistical relationship.

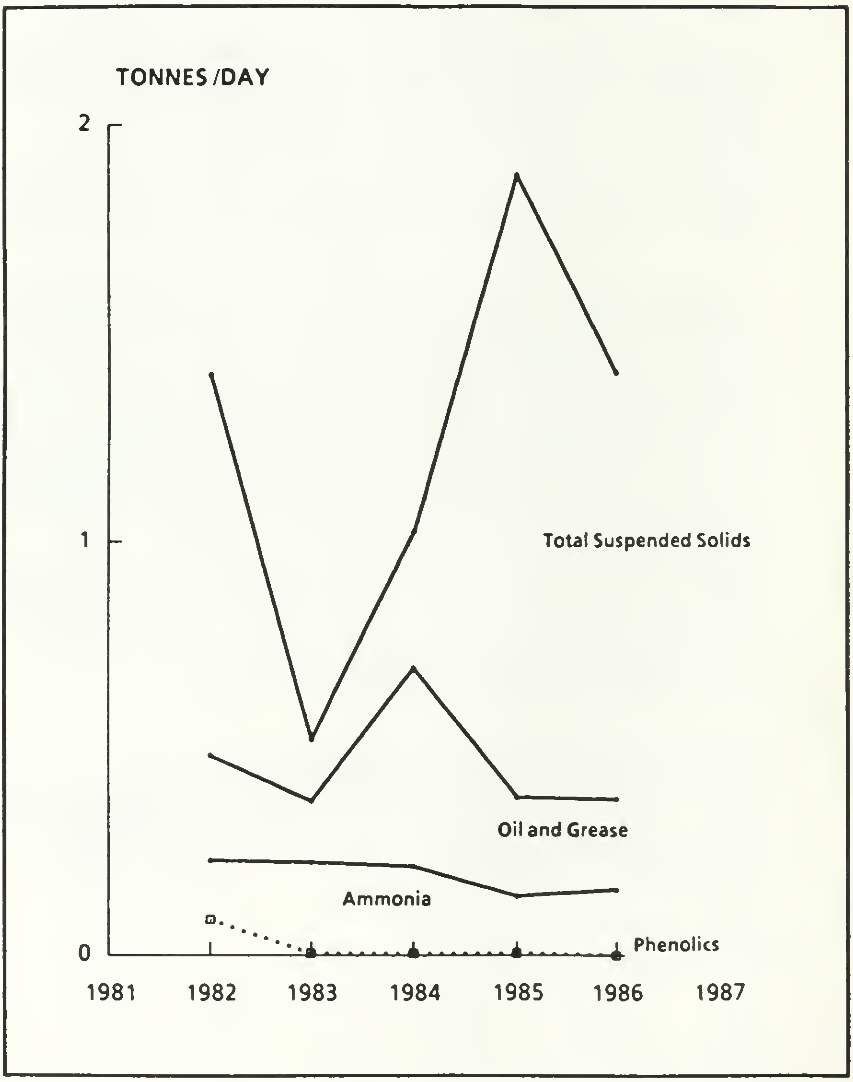
The high degree of compliance with federal and Provincial environmental objectives by Ontario refineries is exemplary. However, as shown in Tables 5 and 7, previously discussed compliance assessments cover about 13 parameters. The MISA program is intended to set discharge limits for a much wide range of other contaminants.

Figure 11

REFINERIES SECTOR STATUS

FOUR MAJOR PARAMETERS

ONTARIO



Source: Ministry of the Environment, Report on the Industrial Direct Discharges in Ontario, 1987

7.0 CONCLUSIONS

Refinery capacity and employment has contracted in recent years due to closures and slow growth in product demand. Long-term growth is expected to be modest at best. Large capital investments have been made at Ontario refineries to keep these facilities competitive. Smaller, less efficient refineries have been shut down. There is still much uncertainty about the future in terms of oil prices and competitive pressures.

The industry in Ontario has exhibited a high degree of compliance with federal environmental requirements. In future, the MISA program will set effluent limits on a much wider variety of chemical contaminants.

7.1 Industry Outlook

The medium and long term outlook for Ontario's petroleum refining industry sector is uncertain. Growth in demand for petroleum products has been weak and the stock of fuel-using equipment is becoming more fuel efficient. Crude oil prices have increased during 1987 over 1986 but price increases will serve to curtail demand growth.

Refining capacity has been "rationalized" in that some refineries have been closed down but some excess capacity remains. Ontario oil companies currently compete with U.S. and off-shore producers for export and domestic sales.

Oil company representatives have stated that their firms will have to invest in the following types of new plant and equipment in order to stay competitive:

- dwindling supplies of light crude oil will require the installation of new equipment to process heavier, sour crudes and to remove the sulfur from final products,
- changes in product quality requirements will necessitate new processing equipment (Haley, 1987),
- reductions in capacities and restructuring of distribution and retailing infrastructure,
- health, safety and environmental regulatory requirements.

The petroleum products segments of most of the major oil companies have not performed as well financially as the consolidated operations of these firms. The industry may thus be forced to reduce its refining capacity further before profits and returns on these operations are deemed satisfactory. On the other hand, some firms prefer to maintain their own refining operations to ensure product supplies even though the return on this segment is lower than desired.

Data on the contaminant loadings from Ontario refineries indicate that most of the current guidelines are being met.

The refining segment of the oil industry will continue to experience somewhat destabilizing market forces together with cyclic movements in product demand and prices. Consequently, the financial effects of costs of all new environmental requirements (e.g., MISA, Regulation 308 and Regulation 309, etc.) will eventually be evaluated in a comprehensive manner in addition to assessing each regulatory initiative individually.

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